



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,998	10/22/2003	Yeow Kheng Lim	CS02-080	5670

7590 12/14/2004
STEPHEN B. ACKERMAN
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

EXAMINER

SMITH, BRADLEY

ART UNIT	PAPER NUMBER
----------	--------------

2824

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/690,998

Applicant(s)

LIM ET AL.

Examiner

Bradley K Smith

Art Unit

2824

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26-34 is/are allowed.
- 6) ☒ Claim(s) 1-3, 10, 14-16 and 23 is/are rejected.
- 7) ☒ Claim(s) 4-9, 11-13, 17-22, 24 and 25 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1-29/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: search notes.

DETAILED ACTION***Double Patenting***

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, and 14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 20 of copending Application No. 10/328512 (Liu et al.). Although the conflicting claims are not identical, they are not patentably distinct from each other because Liu et al. disclose providing a base; forming a first conductor on the base; forming a first barrier layer over the first conductor; forming a first dual damascene dielectric layer over the first barrier layer; forming a second barrier layer over the first dual damascene dielectric layer; forming a second dual damascene dielectric layer over the second barrier layer forming a third barrier layer over the second dual damascene dielectric layer; forming a masking layer over the first dual damascene dielectric layer; forming a via mask over the masking layer; forming a first via opening in the masking layer using the via mask; removing the via mask; forming a trench mask over the masking layer; forming a first trench opening in the masking layer using the trench mask and simultaneously forming a second via opening in the third barrier layer and second dual damascene dielectric layer using the first via opening; removing the trench mask; forming a second trench opening in the masking layer and in the third barrier layer and second dual damascene dielectric layer using the first trench opening and simultaneously forming a third via opening in the second barrier layer and first dual damascene dielectric layer using the second via opening; removing the masking layer and removing the first barrier layer using the third via opening to form a trench and a via; and filling the trench and the via with a conductor to form a trench and via conductor in contact with the first conductor.

Whereas claim 1 disclose providing a structure having a metal structure formed there over; forming a layer stack over the metal structure; the layer stack comprising, in ascending order: a bottom etch stop layer; a lower dielectric material layer; a middle etch stop layer; a middle dielectric material layer; and an upper dielectric layer; patterning the upper dielectric layer to form an opening exposing a portion of the underlying middle dielectric material layer; the opening having a width; forming a patterned mask layer over the patterned upper dielectric layer leaving exposed opposing portions of the patterned upper dielectric layer; patterning the middle dielectric material layer to form an opening therein using the patterned mask layer and the exposed portions of the upper dielectric layer as masks; the middle dielectric material layer opening exposing a portion of the middle etch stop layer; removing the middle etch stop layer at its exposed portion to form a patterned middle etch stop layer having an opening exposing a portion of the lower dielectric material layer; simultaneously patterning: the patterned middle dielectric material layer using the patterned upper dielectric layer as a mask to form an inchoate upper trench opening; and the lower dielectric material layer using the patterned mask layer and the patterned middle etch stop layer as masks to form an inchoate lower via opening aligned with the inchoate upper trench opening; the inchoate lower via opening exposing a portion of the underlying bottom etch stop layer; removing the patterned mask layer; and removing the patterned upper dielectric material layer, the exposed portions of the patterned middle etch stop layer and the exposed portion of the bottom etch stop layer to convert: the inchoate upper trench opening into a final upper trench opening; and the inchoate lower via opening into a final lower via opening; to form the aligned dual damascene opening.

Claim 14 disclose providing a structure having a metal structure formed there over; forming a layer stack over the metal structure; the layer stack comprising, in ascending order: a bottom etch stop layer; a lower dielectric material layer; a middle etch stop layer; a middle dielectric material layer; and an upper dielectric layer; patterning the upper dielectric layer to form a rectangular-shaped opening exposing opposing portions of the underlying middle dielectric material layer; the rectangular-shaped opening having a width and a length; forming a patterned mask layer over the patterned upper dielectric layer, filling the opposing ends of the length of the rectangular-shaped opening and leaving exposed portions of the patterned upper dielectric layer; patterning the middle dielectric material layer to form an opening therein using the patterned mask layer and the exposed portions of the upper dielectric layer as masks; the middle dielectric material layer opening exposing a portion of the middle etch stop layer; removing the middle etch stop layer at its exposed portion to form a patterned middle etch stop layer having an opening exposing a portion of the lower dielectric material layer; simultaneously patterning: the patterned middle dielectric material layer using the patterned mask layer and the patterned upper dielectric layer as masks to form an inchoate upper trench opening; and the lower dielectric material layer using the patterned middle etch stop layer as a mask to form an inchoate lower via opening aligned with the inchoate upper trench opening; the

Art Unit: 2824

inchoate lower via opening exposing a portion of the underlying bottom etch stop layer; removing the patterned mask layer; and removing the patterned upper dielectric material layer, the exposed portions of the patterned middle etch stop layer and the exposed portion of the bottom etch stop layer to convert: the inchoate upper trench opening into a final upper trench opening; and the inchoate lower via opening into a final lower via opening; to form the aligned dual damascene opening.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(f) he did not himself invent the subject matter sought to be patented.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2824

2. Claims 1-3, 10, 14-16 and 23 are rejected under 35 U.S.C. 102(e and f) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Liu et al. (US 2004/0121585). With regards to claims 1 and 14, Liu et al. disclose providing a structure having a metal structure formed there over; forming a layer stack over the metal structure; the layer stack comprising, in ascending order: a bottom etch stop layer; a lower dielectric material layer; a middle etch stop layer; a middle dielectric material layer; and an upper dielectric layer; patterning the upper dielectric layer to form an opening exposing a portion of the underlying middle dielectric material layer; the opening having a width; forming a patterned mask layer over the patterned upper dielectric layer leaving exposed opposing portions of the patterned upper dielectric layer; patterning the middle dielectric material layer to form an opening therein using the patterned mask layer and the exposed portions of the upper dielectric layer as masks; the middle dielectric material layer opening exposing a portion of the middle etch stop layer; removing the middle etch stop layer at its exposed portion to form a patterned middle etch stop layer having an opening exposing a portion of the lower dielectric material layer; simultaneously patterning: the patterned middle dielectric material layer using the patterned upper dielectric layer as a mask to form an inchoate upper trench opening; and the lower dielectric material layer using the patterned mask layer and the patterned middle etch stop layer as masks to form an inchoate lower via opening aligned with the inchoate upper trench opening; the inchoate lower via opening exposing a portion of the underlying bottom etch stop layer; removing the patterned mask layer; and removing the patterned upper dielectric material layer, the exposed

Art Unit: 2824

portions of the patterned middle etch stop layer and the exposed portion of the bottom etch stop layer to convert: the inchoate upper trench opening into a final upper trench opening; and the inchoate lower via opening into a final lower via opening; to form the aligned dual damascene opening (see paragraphs 0039- 0062 figures 2-14). With regards to claims 10 and 23, Liu disclose forming a dual damascene structure (see paragraph 0030). With regards to claims 2, 3, 15, and 16 to claims However Liu et al. fails to disclose the substrate is a semiconductor made of silicon. Where it would be obvious to one of ordinary skill in the art at the time the invention was made to make the substrate out of silicon, because the use of silicon substrates in integrated circuit manufacturing is well known in the art.

3. Claims 1-3, 13, 14-16, and 23 provisionally rejected under 35 U.S.C. 103(a) as being obvious over copending Application No. 10/328512 which has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under 35 U.S.C. 102(e) if published or patented. This provisional rejection under 35 U.S.C. 103(a) is based upon a presumption of future publication or patenting of the conflicting application.

This provisional rejection might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was derived from the inventor of this application and is thus not the invention "by another," or by a showing of a date of invention for the instant application prior to the effective U.S. filing date of the copending application under 37 CFR 1.131. For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the

Art Unit: 2824

subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Allowable Subject Matter

4. Claims 26-34 are allowed.
5. Claims 4-9, 11-13, 17-22, 24 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. The following is a statement of reasons for the indication of allowable subject matter: the prior art or record neither teaches nor suggest within the context of the entire claim, the particular materials claimed (claims 4, 5, 17 and 18), the lower dielectric being the same as the middle dielectric (claim 6 and 19), the upper dielectric being the same as the middle dielectric (claims 7 and 20), the particular dimensions of the layers and openings within the layers (see claims 8, 9, 11-13, 21, 22, 24-34).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K Smith whose telephone number is (571) 272-1884. The examiner can normally be reached on 10-6 Monday through Friday.

Art Unit: 2824

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Brad Smith', is positioned above the printed name.

Brad Smith
Primary Examiner
Art Unit 2824